A DESIGN TOOL TO OPTIMIZE SOLAR GAINS AND ENERGY USE IN NEIGHBOURHOODS

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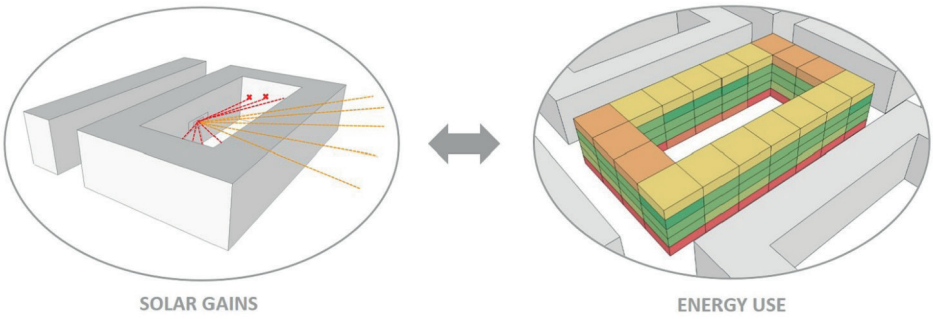

Design tool for the optimisation of solar gains and energy use in neighbourhoods

WHICH ARE YOUR ARCHITECTURAL (R)SOLUTIONS TO THE SOCIAL, ENVIRONMENTAL AND ECONOMIC CHALLENGES OF TODAY?

Research Summary

In cold and moderate climates, the optimisation of solar gains is an important issue to answer the challenge of reducing energy expenditures in buildings. During the master planning of neighbourhoods, design decisions related to the urban layout and geometry can affect the availability of solar radiation considerably. However the impact of those decisions on the heating energy consumption is often neglected because of the lack of appropriate energy simulation tools.

This paper proposes a simple design tool to optimise solar gains and energy use during the master planning phase of neighbourhoods. Using a plugin, implemented in the 3D modelling software SketchUp, detailed information on solar obstructions is extracted from a 3D neighbourhood model. This information can be visualised on sun-path diagrams and linked to a simplified calculation method to assess the neighbourhood energy consumption. Simulations of an urban building block with the developed design tool show a good level of correspondence with results based on more advanced calculations with EnergyPlus.

KEYWORDS: *3D environment, solar obstructions, sun-path diagrams, solar gains, energy use.*